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TECHNICAL NOTES

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HOW TO SEPARATE DAMAGE BY THE EUROPEAN PINE SHOOT MOTH, THE ZIMMERMAN PINE MOTH, AND THE PITCH MASS BORER

Recently the identification of insect damage to pine plantations in Lower Michigan has become complicated by the presence of more than one species of tip- and trunk-infesting moths. The insects in question are: the European pine shoot moth (a tip feeder), the Zimmerman pine moth (a tip and trunk feeder), and the pitch mass borer (a trunk feeder only). The problem exists because of the similarity of damage. However, the larvae can be separated on the basis of body characteristics.

Character of Damage and Description of Larvae

European pine shoot moth.--Damage associated with buds or elongating shoots (fig. 1 on back of page). Larva $1/2$ to $3/4$ inch in length, with a brown body, black head and thoracic shield shaped like a half moon.

Pitch mass borer.--Damage to main stem indicated by pitch mass (fig. 2). Larva 1 to $1-1/4$ inches in length. Head reddish brown, body pinkish white to white, with very small reddish brown hairs.

Zimmerman pine moth.--Damage to elongating shoot (fig. 3); damage to main stem indicated by pitch mass (fig. 4). Larva $3/4$ to 1 inch in length. Head reddish brown, body color varies from grayish white, reddish yellow, to green; arising from each black dot on the body is a single black hair.

Seasonal History

European pine shoot moth.--The larvae overwinter in the mined buds. Small masses of pitch usually occur at the base of the buds. In April, mining is renewed and continues in the buds until June when pupation takes place. In late June the moths emerge and oviposition occurs shortly afterward. The eggs are deposited on all parts of the tree. Newly hatched larvae mine into the base of new needles and later bore into the buds. One generation of this insect occurs annually. See figure 1 for typical damage.

Pitch mass borer.--During June or July, after the pitch mass borer adults have emerged, oviposition presumably takes place in or near wounds or on old scars. Following hatching, the larvae spend at least 2 years boring in the inner bark and sapwood. This activity stimulates the flow of resin, which is deposited by the larva around the entrance hole. Pupation takes place in the mass of pitch at the entrance to the gallery. See figure 2 for typical damage.

Zimmerman pine moth.--The Zimmerman pine moth adult emerges during August and is active only at night. Shortly after emergence the adult lays eggs on the bark near wounds or on branch tips. Some eggs hatch in the fall, while others overwinter and hatch in April.^{1/} Feeding continues in the spring, and pupation takes place in late July in the larval tunnel close to the surface. The moth emerges 1 year after oviposition. See figures 3 and 4 for typical damage.

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(Over)



Figure 1.--European pine shoot moth injury to elongating shoots of Scotch pine.

Figure 2.--Pitch mass borer injury to main stem of Scotch pine.

Figure 3.--Zimmerman pine moth injury to elongating shoots of Scotch pine.

Figure 4.--Zimmerman pine moth injury to main stem of red pine.